

End  
waveguide, an output slab waveguide including an input side and an output side, said input side of said output slab waveguide being connected to said output side of said arrayed waveguides,

a plurality of output waveguides connected to said output side of said output slab waveguides;

a wedge-shaped groove formed in said arrayed waveguides; and

a material filled in said groove, said material having a negative refractive index temperature coefficient;

wherein said material disposed in said groove confines light incident to said groove in a vertical and a horizontal direction thereby preventing the light from spreading in said groove.

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